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Original Article

Study to Assess the Effectiveness of Brahmi Versus Walnut On Improvement of Cognitive Performance Among Geriatric Population Residing in Selected Areas of Derabassi, District Mohali, Punjab

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Abstract

Background: Cognitive performance in the elderly encompasses a wide range of mental processes, including memory, attention, language, reasoning, and problem-solving abilities. These cognitive functions are vital for daily functioning, independence, and overall quality of life.

Methodology: A randomized control trial with parallel arm design was adopted. Initially, 210 geriatric people were screened for cognitive impairment using Mini Status Mental Examination Scale. The geriatric people (150) who had cognitive performance score below 24 were included in the study. The Samples were allocated to either Brahmi (75) or Walnut group (75). The Brahmi group received standardized Bacopa monniera extract (250mg) B.D. for 3 consecutive months and for Walnut group 7 unshelled walnut soaked overnight was administrated in the empty stomach for 3 consecutive months and post test was conducted at day 30, 60 and 90.

Results: The mean age of samples was 67± 2.5 years. Majority of the samples (53.3%) were Male. Majority of the geriatric population (72.9%) had memory loss. The ANOVA for repeated measures in Brahmi group showed that there was significant difference in cognitive performance values among various observations ($F=42.39$, $p<0.000$). Similarly, in Walnut group ANOVA for repeated measures showed that there was significant difference in cognitive performance values among various observations ($F=37.06$, $p<0.000$).

Conclusion: The present findings prove that both Brahmi and Walnut were effective in improving the cognitive performance of geriatric population. However, Brahmi was more effective in improving the cognitive performance of geriatric population when compared to the Walnut. Hence, it is recommended to administer Brahmi to late adults to prevent cognitive impairment.

Key words: Cognitive performance, Geriatric Population.

Introduction

Worldwide the population of elderly, 60 years and above is expanding rapidly. This phenomenon is attributed to low fertility rates, distinguished public health policies, inventions in health technology, improved medical and public health standards and also the elevated life expectancy. As life expectancy continues to increase, public health system has a big health challenge to improve quality of life and minimize cognitive disability in old age (Livingston et al., 2017).

Globally, one in six individuals will be sixty or older by 2030. By this era, it will be 1.4 billion people over the age of 60, up from 1 billion in 2020. There will be two times as many individuals over the age of 60 years in the globe by 2050 (2 billion). (C.S. Huang et al., 2023). One of the most significant concerns associated with aging is cognitive decline, which refers to a gradual decrease in cognitive abilities over time. This decline can vary from mild cognitive impairment, to more severe conditions such as dementia and Alzheimer's disease, where cognitive impairment significantly impacts daily functioning and quality of life (Birben et al., 2012a).

cognitive decline can increase the risk of accidents, falls, and other safety concerns, posing significant challenges for caregivers and healthcare providers (Bonda et al., 2010).

Brahmi, scientifically known as Bacopa monnieri, has a long-standing reputation as a cognitive enhancer, deeply rooted in traditional Ayurvedic medicine. This perennial herb, native to wetlands in parts of Asia, has been utilized for centuries to support cognitive function, memory retention, and mental clarity. The active compounds found in Brahmi, primarily known as bacosides, are believed to play a pivotal role in its cognitive-enhancing effects. (Schwab & McGeer, 2008).

Clinical trials involving human participants have further corroborated Brahmi's cognitive-enhancing properties, providing evidence of its efficacy in improving memory, attention, and cognitive processing speed, particularly in older adults experiencing age-related cognitive decline. (W.-Y. Wang et al., 2015).

Walnuts, the edible seeds of the Juglans genus tree, have emerged as a promising dietary component associated with cognitive enhancement. (Walker et al., 2005).Observational studies have investigated the associations between walnut intake and cognitive function in large population cohorts, providing additional evidence of walnuts' cognitive benefits. These studies have reported positive correlations between walnut consumption and measures of cognitive performance. (Fukuda et al., 2003).

Combining Brahmi and Walnut as herbal remedies for cognitive enhancement in older adults holds promise due to their complementary mechanisms of action and synergistic effects on brain health. Brahmi's neuroprotective and memory-enhancing properties, combined with Walnut's antioxidant and omega-3 fatty acid content, may offer a holistic approach to supporting cognitive function and reducing the risk of age-related cognitive decline and neurodegenerative diseases (Lenore Arab et al., 2019).

R. Jiang (2002) describe herbal remedies like Brahmi and Walnut have gained attention for their potential cognitive-enhancing properties, supported by traditional use and emerging scientific evidence. Brahmi, in particular, has been studied for its memory-enhancing and neuroprotective effects, attributed to its active compounds known as bacosides. Similarly, Walnut, rich in omega-3 fatty acids and antioxidants, has been associated with improvements in memory and executive function in older adults.

The investigation of Brahmi and Walnut in improving cognitive performance among the geriatric population is of paramount importance in addressing the rising prevalence of cognitive decline and neurodegenerative diseases in aging societies. By exploring the efficacy, safety, and mechanisms of action of Brahmi and Walnut interventions, researchers can contribute to the development of evidence-based strategies for cognitive enhancement in aging populations, ultimately improving outcomes and quality of life for older adults worldwide.

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OBJECTIVES

1. Assess the pre-test and post-test level of cognitive performance among geriatric population in Brahmi group and Walnut group.
2. Determine the effectiveness of Brahmi on cognitive performance among geriatric population.
3. Determine the effectiveness of Walnut on cognitive performance among geriatric population.
4. To compare the post-test level of cognitive performance among geriatric population in Brahmi and Walnut group.
5. Find out the association between pre-test level of cognitive performance among geriatric population and their selected demographic variables in Brahmi and Walnut group.

Hypothesis

All hypotheses will be tested at a 0.05 level of significance.

H_1: The mean post-test score of cognitive performance of geriatric population will be significantly higher than the mean pretest scores in both Brahmi and Walnut Group.

H_2: There will be a significant difference between the mean post-test score of cognitive performance among geriatric population in Brahmi and Walnut Group.

H_3: There will be a significant association between pre-test level of cognitive performance among geriatric population with their selected demographic variable in Brahmi group.

H_4: There will be a significant association between pre-test level of cognitive performance among geriatric population with their selected demographic variable in walnut group.

Research Methodology

Research Approach: An evaluative approach is considered to be the most suitable for the study.

Research Design: The design selected for the present study was non randomized control trial with parallel arm design was chosen.

Data Collection Tool

Tools were developed to generate necessary data:

Section A: Assessment of Demographic profile of geriatric population

Section B: Assessment of level of cognitive performance among geriatric population

The Mini-mental state examination is used to measure cognitive impairment in older adults a standardized tool developed by Folstein et al.

Intervention Schedule

In Brahmi group Standardized Bacopa monniera extract, in the form tablet containing 250 mg of the extract, is administrated to geriatric people with cognitive impairment, BD for 3 consecutive months. To the Walnut group 7 unshelled walnuts (30 gm), soaked overnight were administered on an empty stomach for three consecutive months was implemented as a dietary intervention for geriatric people coping with cognitive impairment. Each evening prior to bedtime, samples were asked immerse six unshelled walnuts in water for soaking overnight. Following a period of soaking, samples were directed to meticulously drain and rinse the walnuts the subsequent morning, ensuring the removal of any extraneous debris.

Moreover, samples were advised to uphold a consistent daily water intake of at least 2 liters throughout the duration of the study, emphasizing the importance of adequate hydration to mitigate any potential gastrointestinal discomfort or dehydration.

Data Collection Procedure

The data for the main study was collected from the Samgoli and Mukandpur village. Before starting data collection administrative permission and ethical clearance was obtained from research cell and from the sarpanch of the Samgoli and Mukandpur in Derabassi, , District Mohali, Punjab. This study has been registered under clinical trial registry of India. The assigned CTRI number for this trial is CTRI/2024/03/064714. Before data Collection a brief introduction about self and purpose of study was explained to the samples and written informed consent was obtained from them.

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Confidentiality regarding the data was assured to get cooperation throughout the procedure of data collection period.

The screening for cognitive impairment was done for a total of 210 geriatric population residing in Samgoli and Mukandpur in Derabassi, villages, District Mohali, Punjab. After which, the geriatric population were categorized into severe cognitive impairment (0-17), moderate cognitive impairment (18-23), no cognitive impairment (24-30). The geriatric those who have no impairment were excluded from the study. In the initial screening 150 geriatric people was found to have cognitive impairment. Following the identification of impairment, geriatric people were allocated to either Brahmi (75) or Walnut group (75). The allocation of samples to Brahmi and Walnut group was done by village health nurse using permutated block randomization method with block size of 4,6,8 and allocation concealment was done by sequentially numbered opaque sealed envelope (SNOSE).

On day 1 base line assessment of level of cognitive performance was done (CP_1), which was followed by the administration of standardized Bacopa monniera extract (250mg) two tablets per day for 3 consecutive months to geriatric population in Brahmi group and for Walnut group 7 (30 gm) unshelled walnut soaked overnight was administrated in the empty stomach for 3 consecutive months and post-test one (CP_2) was done at day 30, post-test two (CP_3) was done at day 60 and post-test three (CP_4) was done day 90. To check adherence to the intervention client daily monitor sheet was used. After taking Brahmi tablet or Walnut samples has to put tick in the sheet.

Ethics Committee Approval

Ethics committee approval was received for this study from the ethics committee of Desh Bhagat University Mandi Gobindgarh,Punjab and written informed consent was obtained from the subjects who participated in this study

Plan for Data Analysis

The data will be analysed in terms of objectives of the study using both descriptive and inferential statistics by using SPSS version 23.

Results

The data is analysed and presented under following headings

Section A: Distribution of geriatric population based on demographic variables.

Table 1: Distribution of demographic variables of geriatric population

Demographic Variables		f	%
Age in years (Mean, SD)		67± 2.5	
Gender	Male	112	53.3
	Female	98	46.7
Religion	Sikh	122	58.1
	Hindu	46	21.9
	Muslim	23	11.0
	Christian	19	9.04
Education	Primary education	77	36.7
	Secondary education	62	29.5
	Senior secondary	44	21.0
	Diploma/ Graduation	27	12.9

https://doi.org/10.46376/ijmr/07.05.2026:3464-3474

Marital Status	Married	179	85.2
	Unmarried	4	1.9
	Widow/widower	21	10.0
	Divorcee	6	2.9
Occupation (Past)	Govt. Employee	17	8.1
	Private Employee	68	32.4
	Self- Employed	43	20.5
	Business	28	13.3
	Labourer	54	25.7
No. of children	None	0	0.0
	One	65	31.0
	Two	121	57.6
	Three and Above	24	11.4
Monthly income per capita in Rupees	Less than Rs 2,400	27	12.9
	Rs 2,401- Rs 7,100	43	20.5

Section B: Screening of cognitive impairment among geriatric population. Table 2: Screening of cognitive impairment among geriatric population

Level of Cognitive impairment	**f**	**%**
Severe impairment	68	32.4
Mild impairment	82	39.0
No Impairment (normal)	60	28.6

Section C: Assessment of pre-test and post-test cognitive performance level among geriatric population.

Table 3: Frequency and percentage distribution of level of cognitive performance in pre-test (cp_1), post-test one (cp_2) post-test two (cp_3) and post-test three (cp_4) among geriatric population in both brahmi group and walnut group.

Level of CP	**Brahmi Group**								**Walnut Group**							
	CP_1		**CP_2**		**CP_3**		**CP_4**		**CP_1**		**CP_2**		**CP_3**		**CP_4**	
	f	%	f	%	f	%	f	%	f	%	f	%	F	%	f	%
Severe	32	42.7	28	37.3	25	33.3	22	29.3	29	38.7	27	36.0	25	33.3	23	30.7
Mild	43	57.3	47	62.7	38	50.7	36	48.0	46	61.3	48	64.0	41	54.7	38	50.7
Normal	0	0.0	0	0.0	12	16.0	17	22.7	0	0.0	0	0.0	9	12.0	14	18.7

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Table 4 : Description of overall mean, SD and mean percentage cognitive performance (CP)values of pre-test (CP_1) and consequent post-test one (CP_2) post-test two (CP_3) and post-test three (CP_4) among geriatric population in the brahmi and the walnut group.

Cognitive performance		Brahmi Group		Walnut Group		Difference in Mean %
		Mean	SD	Mean	SD	
Observation	CP_1	10.12	1.04	11.21	1.05	1.09
	CP_2	12.21	2.15	12.98	2.01	1.77
	CP_3	16.32	2.38	14.45	2.45	1.87
	CP_4	21.23	2.67	18.95	2.56	2.37

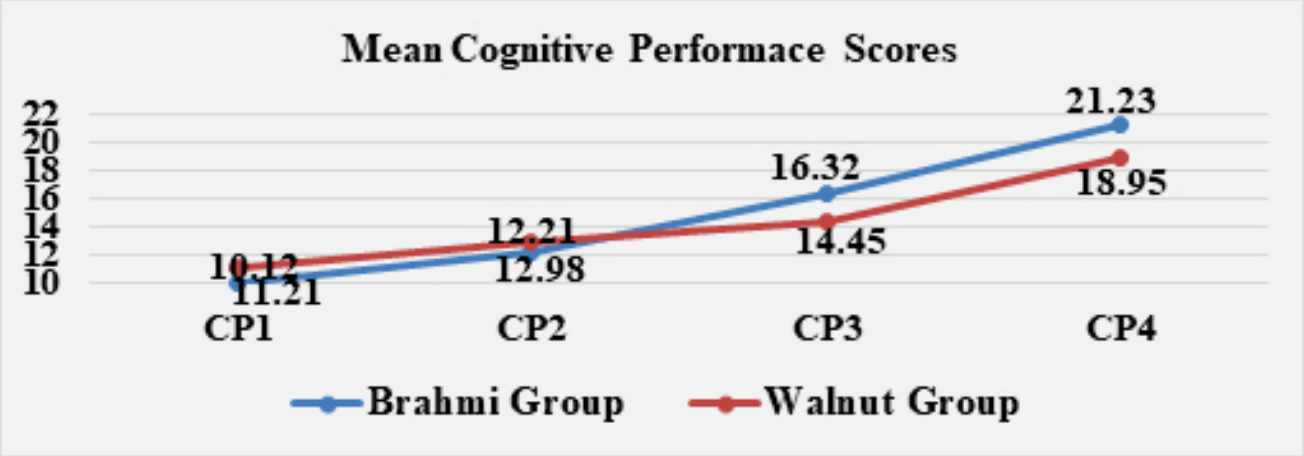

Figure 1: Line graph showing the mean cognitive performance values of pre- and consequent post-tests of brahmi and walnut group.

Normality of The Distribution Through Kolmogorov – Smirnov Goodness of Fit Test

Purposive sampling technique was adopted to select the geriatric population**.** The investigator wants to use the parametric test to compute repeated measures ANOVA. Therefore, the Kolmogorov-Smirnov test was applied to check the sample for normal distribution.

Table 5: Description of normal distribution using one sample kolmogorov–smirnov test for pre-test cognitive performance value (CP1) among geriatric population in both brahmi and walnut group.

Group	Test Parameters				Most Extreme Differences		
	Mean	SD	D Value	p value	Absolute	Positive	Negative
Brahmi Group	10.12	1.04	.853	.284	0.0850	0.0851	-0.0849
Walnut Group	11.21	1.05	.760	.234	0.0755	0.0755	-0.0753

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Testing Hypotheses

This section deals with the significance of difference between the pre-test and consecutive post-tests cognitive performance values of geriatric population . A Repeated measures of ANOVA was used to test the hypothesis.

The first step was to check for the sphericity by applying Mauchly's test of Sphericity.

Table 6: Mauchly's test of sphericity for cognitive performance values of pre-test (CP_1), post-test one (CP_2) post-test two (CP_3) and post-test three (CP_3) among geriatric population in both brahmi and walnut group.

Group	Mauchly's W	Approx. Chi-square	Sig.	Sphericity Assumed	Epsilon		
					Greenhouse-Geisser	Hyunch-Feldt	Lower bound
Brahmi Group	0.745	51.361	0.017	0.731	0.739	0.758	0.338
Walnut Group	0.722	30.862	0.061	0.805	0.816	0.830	0.321

The above table 6 depicts computed Mauchly's W was 0.745 for Brahmi group and 0.722 for Walnut group for the cognitive performance variable among the geriatric population. In Brahmi group P value is 0.017, which is lesser than 0.05 level of significance. Hence

Table 7. Levene's test for equality of variances for pre-test cognitive performance value (cp_1) among geriatric population in both brahmi and walnut group.

Levene's test				
Group	Mean	SD	F	p value
Brahmi Group	10.12	1.04	0.782	0.377
Walnut Group	11.21	1.05		

H_{01}: There is no significant difference between the mean post-test cognitive performance values and the pre-test cognitive performance value among geriatric population.

Table 8: Description of cognitive performance values among geriatric population in both brahmi and walnut group through repeated measure ANOVA.

Observation	Brahmi Group				Walnut Group			
	Mean	SD	F Value	p Value	Mean	SD	F Value	p Value
Pre-test CP_1	10.12	1.04	42.39	0.000 ***	11.21	1.05	37.06	0.000 ***
Post-test I CP_2	12.21	2.15			12.98	2.01		
Post-test II CP_3	16.32	2.38			14.45	2.45		
Post-test III CP_4	21.23	2.67			18.95	2.56		

***** Significant at 0.001 level (P< 0.001)**

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Table 9: Description of cognitive performance values within brahmi and walnut groups through post hoc bonferroni test

Observation		Brahmi Group				Walnut Group			
		Mean Difference	SE	F Value	P Value	Mean Difference	SE	F Value	p Value
Pre-test CP_1	Post-test I CP_2	2.09	0.067	14.58	0.000***	1.77	0.377	2.57	0.432 (NS)
	Post-test II CP_3	6.2	.098	49.47	0.000***	3.24	.490	4.33	0.000***
	Post-test III CP_4	11.11	0.076	61.70	0.000***	7.74	.455	27.73	0.000***

***** Significant at 0.001 level (P< 0.001)**

NS – Not significant (P > 0.05)

Section D: Association of pre-test level of cognitive performance among geriatric population with selected demographic variables.

Table 10: Association Between Pre-Test Level of Cognitive Performance And Demographic Variables Among Geriatric Population In Brahmi Group.

Demographic Variables		Total	Severe (32)	Mild (43)	Chi square Test
Gender	Male	44	21	23	$\chi 2$= 1.114
	Female	31	11	20	p=0.291
					df= 1
Religion	Sikh	39	13	26	**$\chi 2$= 11.49**
	Hindu	19	6	13	**p=0.009****
	Muslim	9	8	1	**df= 3**
	Christian	8	5	3	
Education	Primary education	28	14	14	**$\chi 2$= 8.16**
	Secondary education	23	5	18	**p=0.042***
	Senior secondary	16	7	9	**df= 3**
	Diploma/ Graduation	8	6	2	

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Marital Status	Married	63	24	39	$\chi 2$= 3.36
	Widow/widower	9	6	3	P=0.18
	Divorcee	3	2	1	df= 2
Occupation (Past)	Govt. Employee	5	4	1	**$\chi 2$= 18.02**
	Private Employee	28	19	9	**p=0.001****
	Self- Employed	15	4	11	**df= 4**
	Business	14	3	11	
	Labourer	13	2	11	
No. of children	Two	37	12	25	$\chi 2$= 3.12
	Three and Above	38	20	18	p=0.077
					df= 1
Monthly income per capita in Rupees	Less than Rs 2,400	9	4	5	$\chi 2$= 2.05
	Rs 2,401- Rs 7,100	19	6	13	p=0.725
	Rs 7,101- Rs 12,000	21	11	10	df= 4
	Rs12,001 – Rs 18,000	18	7	11	
	Rs 18,001- Rs 24,000	8	4	4	

*** Significant at 0.05 level, (P< 0.05)**

Table 11: Association between pre-test level of cognitive performance and demographic variables among geriatric population in Walnut Group

Demographic Variables		Total	Severe (29)	Mild (46)	Chi square Test
Gender	Male	48	21	27	$\chi 2$= 1.452
	Female	27	8	19	P=0.228
					df= 1
Religion	Sikh	43	11	32	**$\chi 2$= 7.753**
	Hindu	12	6	6	**P=0.049***
	Muslim	14	8	6	**df= 3**
	Christian	6	4	2	
Education	Primary education	26	11	15	**$\chi 2$= 8.757**
	Secondary education	15	10	5	**P=0.032***
	Senior secondary	22	6	16	**df= 3**
	Diploma/ Graduation	12	2	10	
Marital Status	Married	68	26	42	$\chi 2$= 0.117
	Widow/widower	5	2	3	P=0.942
	Divorcee	2	1	1	df= 2

https://doi.org/10.46376/ijmr/07.05.2026:3464-3474

Occupation (Past)	Govt. Employee	7	6	1	**χ2= 17.95 P=0.001** df= 4**
	Private Employee	30	16	14	
	Self- Employed	12	4	8	
	Business	10	2	8	
	Labourer	16	1	15	
No. of children	Two	33	13	20	χ2= 0.013 P=0.908 df= 1
	Three and Above	42	16	26	
Monthly income per capita in Rupees	Less than Rs 2,400	5	2	3	χ2= 7.01 P=0.135 df= 4
	Rs 2,401- Rs 7,100	14	9	5	
	Rs 7,101- Rs 12,000	24	7	17	
	Rs12,001 – Rs 18,000	20	5	15	
	Rs 18,001- Rs 24,000	12	6	6	

*** Significant at 0.05 level, (P< 0.05)**

The data presented in Table 11 portrays that the association between pre-test level of cognitive performance among geriatric population and the demographic variables in walnut group. Pearson Chi-square test was used to calculate the association. There was significant association between pre-test level of cognitive performance and demographic variables such as religion ($\chi2$ =7.753, p= 0.049), education ($\chi2$ =8.757, p= 0.032), Occupation ($\chi2$ =17.95, p= 0.001). Hence null hypothesis (H0) was rejected for religion, education, occupation and null hypothesis was accepted for other characteristics.

Delimitation

- The generalizability of the study may be limited as it might have been conducted in a specific setting with a small sample size, potentially restricting the applicability of the results to other villages of India.

Recommendations

- Replication of this study with a larger sample size to enhance statistical power and improve the generalizability of the findings. Qualitative studies may be conducted to explore the experiences and perspectives of geriatric population participating in the interventions, as well as their caregivers and healthcare providers. This qualitative approach would offer a deeper understanding of factors influencing acceptance, adherence, and outcomes related to the interventions, helping to inform future implementation strategies.

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Conflicts of interests: There is no conflict of interest

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